

NON-PUBLIC?: N
ACCESSION #: 8903210164

LICENSEE EVENT REPORT (LER)

FACILITY NAME: SHEARON HARRIS NUCLEAR POWER PLANT- UNIT ONE
PAGE: 1 of 3

DOCKET NUMBER: 05000400

TITLE: REACTOR TRIP ON LOW STEAM GENERATOR LEVEL DUE TO MAIN
FEEDWATER PUMP
SHAFT FAILURE
EVENT DATE: 02/06/89 LER #: 89-003-00 REPORT DATE: 03/08/89

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION
50.73(A)(2)(IV)

LICENSEE CONTACT FOR THIS LER:
NAME: Andrew J. Howe - Senior Specialist TELEPHONE: 919-362-2719

COMPONENT FAILURE DESCRIPTION:
CAUSE: A SYSTEM: SJ COMPONENT: P MANUFACTURER: I075
A SJ CPLG Z010
REPORTABLE TO NPRDS: Y
Y
SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT:

February 6, 1989, with the plant operating at 100% power, at 0008 the shaft of the A Main Feedwater Pump (MFP) sheared, causing a sudden reduction in feedwater flow to the steam generators. Within seconds the MFP tripped, causing a turbine runback. The operators took manual control of the feedwater regulating valves and attempted to raise steam generator levels, but the reactor tripped on low steam generator level approximately one minute after the transient began. The plant response to the reactor trip was normal, with all auxiliary feedwater pumps automatically starting to maintain steam generator levels, and the operator manually closing the main steam isolation valves to control the primary plant cooldown. The main generator exciter field breaker did not trip open, and was observed to be smoking. The breaker was locally opened and an extinguisher used on the breaker to prevent ignition. The exciter field breaker was found to have a burned out trip coil which was subsequently repaired.

The MFP shaft was found to be sheared near the coupling between the pump and the coupling. The damaged shaft was sent to a company laboratory, and the preliminary cause was determined to be long term cyclic fatigue. The event caused internal damage to the pump motor, as well as minor missile damage to components in the near vicinity.

Prior to plant restart, the undamaged B MFP shaft keyway was examined and found to be in satisfactory condition. The plant was restarted and brought to approximately 60% power on February 9. Repairs were completed to the A MFP and the nearby components on February 14, and the plant was returned to full power operations. The final results of the examination of the failed shaft will be used to determine any necessary long term corrective actions.

END OF ABSTRACT

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EVENT DESCRIPTION

On February 6, 1989, the plant was operating at full power, 885 net Mwe. At 0008:57, main control room alarms were received indicating a steam/feedwater flow mismatch, and a loud explosive sound was heard in the main control room, followed by the sound of the unloading of an electric motor. Within seconds, the A Main Feedwater Pump (MFP) (EIIS:SJ:P) (Manufacturer Ingersoll-Rand, model number 16XI9CA) tripped, initiating a runback of the main turbine (EIIS:TA).

The operators in the control room took manual control of the main feedwater regulating valves (EIIS:SJ) to maximize feedwater flow from the operating -3 MFP in order to control steam generator levels. At 0009:24, approximately one half minute after the transient began, one of the two heater drain pumps (EIIS:SN) tripped, and at 0010:05, a reactor trip occurred on low steam generator level.

The plant response to the reactor trip was as expected. The B MFP tripped shortly after the reactor trip due to low flow occurring when the main feedwater regulating valves automatically closed on interlock at a Reactor Coolant System average temperature of 564 deg.F. All three auxiliary feedwater pumps (EIIS:BA) started automatically to control steam generator levels, and the operator manually closed the main steam isolation valves (EIIS:SB) to limit the cooldown of the primary. The main generator exciter field breaker (EIIS:TL) failed to trip open, and was found to be smoking. The breaker is located in the Turbine Building switchgear room, and an operator discovered the situation while entering the room to locally trip the A MFP lube oil pump breaker. No safety related equipment is located in that area. The operator tripped the breaker and used a hand-held extinguisher to ensure no ignition occurred. Upon investigation, the breaker was found to have burned out trip coil. The plant

was stabilized in Mode 3 at approximately 557deg.F.

Shortly after the transient began, an operator locally observed smoke and steam in the vicinity of the A MFP motor Lo pump coupling (EIIS:SJ:CPLG). Minor missile damage was apparent to piping and conduit in the area. The pump shaft was stopped and the motor was turning rapidly. After coastdown, the pump began to turn slowly due to recirculation flow; this flowpath was isolated and the pump was secured. Damage to the pump motor occurred due to its rotation with an unbalanced, unsupported coupling.

The shaft between the MFP coupling and pump was sheared and a crack beginning at the root of the keyway that attaches the pump shaft to the coupling was observed. The shearing of the shaft caused the coupling to come loose, which subsequently generated missiles, causing minor damage to components in the local vicinity. The high motor vibration sheared a lubrication oil line to the rear motor bearing (EIIS:SK), and caused further piping damage. There were no personnel injuries as a result of these events, and the damage was confined to the local vicinity.

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CAUSE

The shaft and coupling were removed and sent to a company laboratory for examination. The preliminary results indicated that a crack covering approximately 2/3 of the shaft cross-sectional area had existed for a period of time prior to the sudden failure. This area showed discoloration due to corrosion. The cause of this crack is believed to be long term cyclic fatigue. Vibration readings from the pump are routinely obtained, and these readings showed no adverse trends prior to this event.

The B MFP was subsequently examined to ensure that no similar cracks existed. The results of this examination were satisfactory, and the B MFP was returned to service. The plant was restarted and brought to approximately 60% power on February 9. Repairs to the A MFP and other components damaged by the shaft failure were completed on February 14, and the plant resumed normal full power operation.

SAFETY SIGNIFICANCE

There were no safety consequences as a result of this event. The plant responded as designed following the reactor trip, with the actuation of auxiliary feedwater to maintain steam generator levels.

This event is reportable as an actuation of the reactor protection system and engineered safeguards systems per 10CFR50.73(a)(2)(iv). There have been no

previous similar events involving the shearing of a pump shaft due to cyclic fatigue.

CORRECTIVE ACTIONS

1. The B MFP shaft keyway was inspected to ensure no similar faults existed prior to returning the pump to service on February 9.
2. The A MFP and damage to local components in its vicinity were repaired and the new shaft keyway examined, and the pump was returned to service on February 14.
3. Upon completion of the investigation to determine the failure mechanism of the sheared shaft, long term actions to prevent recurrence will be determined and implemented as necessary.

ATTACHMENT 1 TO 8903210164 PAGE 1 OF 1

CP&L
Carolina Power & Light Company
MAR 8 1989

HARRIS NUCLEAR PROJECT
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New Hill, NC 27562

File Number: SHF/10-13510C
Letter Number: HO-890028 (0)

U.S. Nuclear Regulatory Commission
ATTN: NRC Document Control Desk
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT UNIT 1
DOCKET NO. 50-400
LICENSE NO. NPF-63
LICENSEE EVENT REPORT 89-003-00

Gentlemen:

In accordance with Title 10 to the Code of Federal Regulations, the enclosed Licensee Event Report is submitted. This report fulfills the requirement for a written report within thirty (30) days of a reportable occurrence and is in accordance with the format set forth in NUREG-1022, September 1983.

Very truly yours,

R. A. Watson
Vice President
Harris Nuclear Project
AJH:tbb

Enclosure

cc: Mr. R. A. Becker (NRR)
Mr. W. H. Bradford (NRC - SHNPP)
Mr. S. D. Ebnetter (NRC - RII)

MEM/LER-89-003/1/OS1

*** END OF DOCUMENT ***
